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EXAMINER

TUGBANG, ANTHONY D

ART UNIT

PAPER NUMBER

3729

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/802,596

Applicant(s)

MATONO, NAOTO

Examiner

A. Dexter Tugbang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 10/175,962.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. The applicant(s) amendment filed on October 18, 2006 has been fully considered and made of record.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Claim Rejections - 35 USC § 102***

3. Claims 9 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al 5,652,687 and Deroux-Dauphin 4,829,659.

Chen discloses a method of manufacturing a magnetic head comprising: a first magnetic layer (e.g. P2 in Fig. 7) having a first pole tip portion (e.g. P2(T)); a second magnetic layer (e.g. P1) having a second pole tip portion; each of the pole tip portions (in the pole top regions) to face a recording medium during operation; a gap layer G sandwiched between the first and second magnetic layers; a thin film coil (e.g. 110) disposed in a space between the first and second magnetic layers; an insulating layer I<sub>2</sub> that fills the space; where the method includes forming the gap layer G with a non-magnetic conductive material; and selectively forming the first pole tip portion P2(T) on the gap layer by growing a plating film with the gap layer used as an electrode (col. 7, lines 44-48). The first magnetic layer P2 of Chen is formed with the first pole tip portion P2(T) as the plating film and as a single layer (shown in Fig. 7).

Regarding Claim(s) 13, Chen further teaches that the non-magnetic conductive material of the gap layer can be made from one of: copper, gold, or nickel chromium (col. 6, lines 33-39).

***Claim Rejections - 35 USC § 103***

4. Claims 9 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santini 6,130,809 in view of Chen et al.

Santini discloses a method of manufacturing a magnetic head comprising: a first magnetic layer (e.g. P2/S1 in Fig. 24) having a first pole tip portion; a second magnetic layer (e.g. P1) having a second pole tip portion; each of the pole tip portions (in the pole top regions) to face a recording medium during operation; a gap layer (e.g. 482) sandwiched between the first and second magnetic layers; a thin film coil (e.g. 462) disposed in a space between the first and second magnetic layers; an insulating layer (e.g. 454, 476) that fills the space; where the method comprises forming the gap layer (e.g. 482) with a non-magnetic conductive material; and selectively forming the first pole tip portion on the gap layer by growing a plating film with the gap layer where the first magnetic layer and the pole tip portion are formed as the plating film in a single layer (e.g. 484 as P2/P1, col. 15, lines 9-13, Fig. 29AA)

Santini does not specifically say whether or not the gap layer is used as an electrode for plating of the first magnetic layer.

Chen teaches that a gap layer, formed of a non-magnetic conductive material, can be used as a seed layer, or electrode, to subsequently form a first magnetic layer (e.g. P2) including a pole top portion by plating (col. 6, lines 32-36 and col. 7, lines 44-49). Seed layers in plating are inherently used as electrodes as they are used to provide the necessary current and voltage for subsequent electroplating of metal layers. As extrinsic evidence, the references to Uzoh (U.S. Patent 6,117,784, col. 4, lines 13-18) and Woo et al (U. S. Patent 6,103,086, col. 2, lines 59-64) are cited to show that seed layers are inherently used as electrodes for plating.

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Regarding Claim(s) 13, Chen mentions that the gap layer is formed of nickel phosphorus or copper (col. 6, lines 32-36).

It is also well worth noting that both Santini and Chen each form art recognized equivalent thin film magnetic heads where each form their first magnetic layer, including their pole tip portion, by plating. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Santini by using the gap layer as an electrode, as taught by Chen, to accurately form and pattern the first magnetic layer with the first pole tip portion by plating within an art recognized equivalent thin film magnetic head.

***Claim Rejections - 35 USC § 103***

5. Claims 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santini in view of Chen et al, as applied to Claim 9 above, and further in view of Armstrong et al 5,901,432.

Santini, as modified by Chen et al, disclose the claimed manufacturing method as relied upon above. The modified Santini method does not mention selectively etching the gap layer through ion milling by using at least the first pole tip portion as a mask and, subsequently, selectively etching the second magnetic layer to a predetermined depth.

Armstrong utilizes an ion milling process that includes selectively etching a gap layer G through ion milling by using the first pole tip portion P2 as a mask and then, selectively etching the second magnetic layer P1 to a predetermined depth (see Fig. 3K and col. 5, line 64 to col. 6, line 24). The purpose of the ion milling process of Armstrong is to align the pole tips with the

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gap layer and advantageously minimize any stray flux leakage around the gap layer (col. 1, lines 52-57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Santini by utilizing the ion milling process of Armstrong, for the advantage of aligning the first and second pole tip portions and minimize any stray flux leakage around the gap layer.

6. Claims 11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santini in view of Chen et al, as applied to Claim 9 above, and further in view of Jones 4,337,132.

Santini, as modified by Chen et al, discloses the claimed manufacturing method as relied upon in Claim 9 above. Claim 15 is met for the same reasons as Claim 13 above. The modified Santini method does not teach that an etching speed through ion milling of the non-magnetic conductive material is within a range from being higher than 0.5 times to being no more than 2 times an etching speed of the second magnetic layer.

Santini does further teach that it is well known and conventional to perform ion milling on the gap layer, first magnetic layer (P2) and second magnetic layer (P1) (see Prior Art Figs. 14 and 15), and it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included such features in the above process to accurately align and pattern these layers.

Additionally, Jones shows that etching speeds through ion milling (see Fig. 8) can be achieved by having the speed (e.g. 400) of the non-magnetic conductive material at 1.3 times higher than the etching speed (e.g. 300) of a magnetic material of NiFe. One advantage of

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having these different etching speeds through ion milling allows accurate vertical side wall patterning with minimum redeposition (col. 1, lines 6-10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Santini by utilizing the etching speeds and non-magnetic conductive material of Jones, for the advantages of accurate vertical side wall patterning with minimum redeposition.

7. Claims 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santini, Chen et al, and Armstrong et al, as applied to Claims 9 and 10 above, and further in view of Jones, for the same reasons set forth in paragraph 6 above. It is noted that Claim 12 is equivalent to Claim 11, Claim 16 is equivalent to Claim 13.

#### ***Response to Arguments***

8. The applicant(s) arguments filed on October 18, 2006 have been fully considered but they are not persuasive.

In regards to the merits of Chen et al as applied in the 102 rejection of Claim 9 above, the applicant(s) argue that Chen cannot meet the limitations of "selectively forming...single layer" (lines 10-12 of Claim 9).

The examiner most respectfully disagrees. In Chen, to say that element 116 is a separate layer that separates P2(T) from P2T is completely erroneous by the applicant(s). Element 116 is not a separate layer, but is merely a region pointed to by Chen that joins by *direct contact* the magnetic layers, e.g. P2(T) and P2T (see col. 8, lines 40-43). Furthermore, Chen even states that P2T is magnetically continuous with P2(T). Therefore, the examiner maintains that first pole tip

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portion and the first magnetic layer are formed as a single layer, being that there is no separate layer that exists between them and that each are magnetically continuous with each other.

The new grounds of rejections (as noted in paragraphs 4-7 above) are necessitated in that Claim 9 was amended to include the previous limitations of Claim 17, now canceled. However, it is well worth noting that the limitations of each of Claims 10, 11 and 13 were never dependent from Claim 17. Therefore, the entire scope, particularly with respect to Claim 9, of the claimed invention has now been changed, which has warranted the new grounds of rejections set forth above.

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



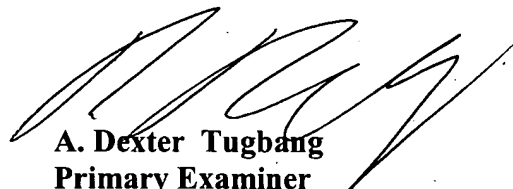
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10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Dexter Tugbang whose telephone number is 571-272-4570.

The examiner can normally be reached on Monday - Friday 7:30 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 571-272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
**A. Dexter Tugbang**  
**Primary Examiner**  
**Art Unit 3729**

December 29, 2006